

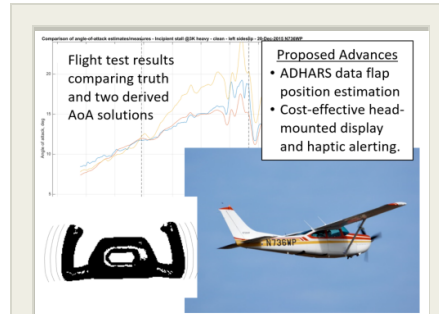
# Development and Assessment of Loss of Control Prevention Techniques, Phase I

Completed Technology Project (2017 - 2017)



## Project Introduction

Our team proposes to develop an innovative Angle of Attack (AoA) system for General Aviation (GA) with the new ability to estimate flap position combined with our derived AoA algorithm yielding the correct AoA for the current aircraft configuration. The algorithm will be combined with cost-effective haptic feedback and a head-mounted display. The result provides a substantial improvement in alerting pilots that they are nearing stall conditions, addressing Loss of Control, which is recognized by the FAA and NTSB as the leading cause of fatal GA accidents. Current GA AoA systems are limited due to lack of flap position information, and their displays are not likely to capture a pilot's attention while maneuvering. Our cost-effective haptic feedback (similar to a 'stick shaker' which is known to be the most effective interface but not compatible with GA aircraft), and our head-mounted display are expected to capture the pilot's attention. AAG's experience in developing and flight testing AoA systems and our history of partnering with avionics manufacturers to develop and flight test commercial avionics systems, uniquely position us to successfully develop and commercialize this innovative AoA system. Our novel derived AoA algorithm has been tested in flight against other AoA systems under FAA and internal funding and shown to have good performance to near-stall conditions. Technical objectives for Phase I are to demonstrate technical feasibility of flap deflection estimation, cost effective haptic alerting in a typical GA cockpit, and cost-effective head-mounted display, and to create a prototype implementation of the integrated AoA system ready to flight test in Phase II. The Work Plan includes: development and evaluation of flap position estimation algorithm in simulation and flight; design, prototype development and inflight evaluation of haptic interface; simulation evaluation of AoA alerting on head-mounted display; and integration of components.



Development and Assessment of Loss of Control Prevention Techniques, Phase I Briefing Chart Image

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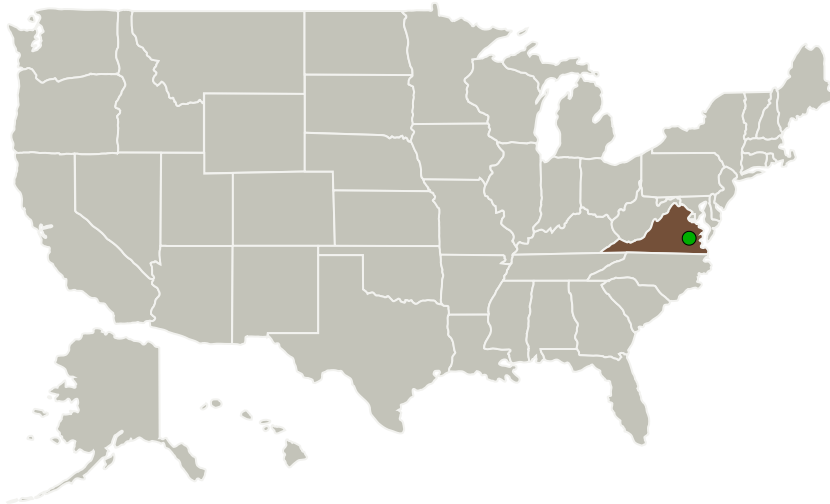
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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Adaptive Aerospace Group, Inc.	Lead Organization	Industry	Hampton, Virginia
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

## Primary U.S. Work Locations

Virginia

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Adaptive Aerospace Group, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

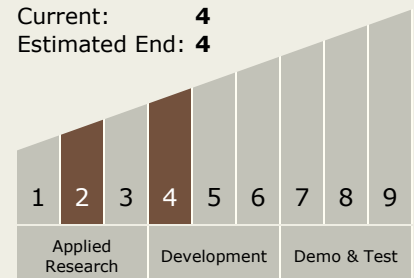
Carlos Torrez

**Principal Investigator:**

Keith D Hoffler

## Technology Maturity (TRL)

Start: 2  
Current: 4  
Estimated End: 4

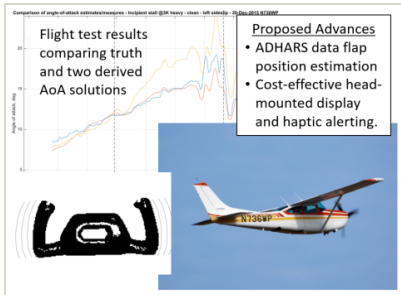


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## Images



### Briefing Chart Image

Development and Assessment of Loss of Control Prevention Techniques, Phase I Briefing Chart Image

(<https://techport.nasa.gov/image/127959>)

## Technology Areas

### Primary:

- TX02 Flight Computing and Avionics
  - └ TX02.2 Avionics Systems and Subsystems
    - └ TX02.2.2 Aircraft Avionics Systems

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System